

**Pierce Mills hydroelectric generating station (FERC No. 2396 VT)  
Arnold Falls hydroelectric generating station (FERC No. 2399 VT)  
Gage hydroelectric generating station (FERC No. 2397 VT)  
Passumpsic hydroelectric generating station (FERC No. 2400 VT)  
St. Johnsbury, Waterford and Barnet, Caledonia County, Vermont**

**2010 Annual CRMP Report**

December 6, 2010

This letter report is provided on behalf of the Central Vermont Public Service Corporation (CVPS) in fulfillment of its obligations regarding the Cultural Resource Management Plan (CRMP) for the Pierce Mills, Arnold Falls, Gage and Passumpsic hydroelectric generating stations, collectively referred to as the Project.<sup>1</sup>

Articles 408, 408, 410, and 408 of the licenses for the Pierce Mills, Arnolds Falls, Gage and Passumpsic generating stations<sup>2</sup>, respectively, require implementation of the provisions of the Programmatic Agreement (PA) executed on November 4, 1994.<sup>3</sup> Under federal law, the FERC is required to consider the effects of hydroelectric projects that it licenses on historic properties. The PA requires the filing of an annual report on activities conducted under the CRMP on the anniversary date of issuance of the license.

***Monitoring Action to Protect Archaeological Historic Properties***

Section 3.2.3. of the CRMP describes that the Project will be monitored annually to limit or prevent bank erosion and protect historic properties in conjunction with other resources. Charity Baker, an archaeologist qualified under 36 CFR 61, conducted the annual monitoring of Project shorelines on August 19, 2010 with CVPS summer intern Ann Costandi, and on August 31, 2010 with Beth Eliason, CVPS Environmental Engineer. The inspection was conducted via canoe to document existing conditions using a handheld Garmin 76CSx GPS unit, a Canon PowerShot SX120IS digital camera, and manual notes. Photographs taken during the 2010 annual inspection are presented in this report with their locations, as indicated on accompanying maps, to document riverbank characteristics.

Provisional 2010 data from the U.S. Geological Survey Passumpsic River gaging station at Passumpsic, Vermont (01135500) indicates that the mean discharge was 217 cubic feet per second (cfs) on August 19 and 187 cfs on August 31. Daily streamflow statistics for 81 years

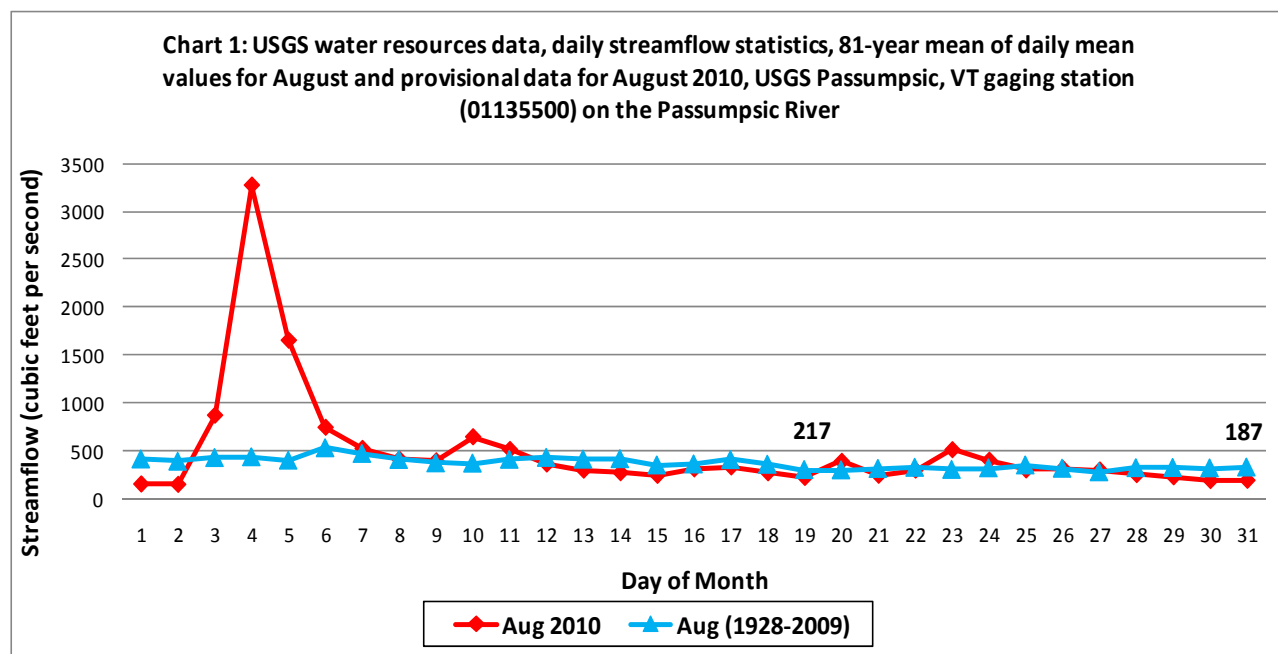
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<sup>1</sup>Frink, Douglas (1998) *Cultural Resource Management Plan for Archaeological and Historic Resources within the Pierce Mills, Arnold Falls, Gage, and Passumpsic Hydroelectric Facilities, St. Johnsbury, Waterford and Barnet in Caledonia County, Vermont (FERC Nos. 2396, 2399, 2397 and 2400)*. Archaeology Consulting Team, Inc. (ACT), Essex, Vermont. Prepared for CVPS, Rutland, Vermont.

<sup>2</sup> Order Issuing Subsequent License, all issued December 8, 1994.

<sup>3</sup> The Programmatic Agreement was executed among the Commission, the Advisory Council on Historic Preservation and the Vermont State Historic Preservation Officer, with the licensee as a concurring party, pursuant to Section 106 of the National Historic Preservation Act and its regulations under 36 CFR 800.

of record (Chart 1) indicate that this volume at the Passumpsic gaging station was below the mean of daily mean values for both August 19 (295 cfs) and August 31 (322 cfs).



From the upper Project limit, below Great Falls Dam and just north of the St. Johnsbury–Lyndon town boundary, to Pierce Mills Dam, the river channel remains relatively unchanged since prior inspections. The right bank just above the limits of the project continues to slump in the vicinity of a power pole that was reset after erosion documented during past inspections (Location 1). The eroding bank, pictured as Location 2, and noted in past annual reports has remained stable during the past several years. No archaeological information was observed during the surface inspection of exposed soils. Several weeks after the 2010 inspection, the generating station at Pierce Mills was vandalized. For additional details, please see Appendix A that includes the architectural historian’s description of the event.

Between the Pierce Mills and Arnold Falls dams, a gravel pit expansion adjacent to the left bank continues to compromise the riparian zone. Moderate bank erosion has been observed at this location since 2000 (Location 3). Sediments from the left bank are accumulating on the opposite bank (Location 4) to form a sand bar protecting the Native American site designated as FS 3 (CA). No archaeological information was observed during the surface inspection of exposed soils. The majority of the lower shorelines of the Arnold Falls impoundment is constricted by railway beds, US Route 5 highway, and associated commercial and residential development. The long-term use of this area by car dealerships is reflected by current businesses (Location 5) and the presence of old cars imbedded in the riverbank below US Route 5 (Location 6).

Riverbank conditions between the Arnold Falls and Gage generating stations remain relatively unchanged from those documented in prior reports. The relatively low water levels during the

2010 exposed the timber crib dam remains associated with the Twin State Gas & Electric Co. No. 2 plant (operated between 1912 and 1944) (Location 7). As noted in past annual reports, stone rip-rip installed by VTrans on the left bank adjacent to US Route 5 upstream from the Gage generating station has slowed the rate of erosion on the steep bank. This section of the riverbank is the most severe example of erosion in the Gage impoundment, although it has not noticeably deteriorated during the past year (Location 8).

Few changes were observed within the Passumpsic impoundment since the 2009 inspection. The majority of the shorelines are bound by agricultural fields and well-developed riparian growth (Location 9). The left bank between the Passumpsic generating station and the railroad bridge approximately 300 meters downstream has remained stable since the 2008 inspection. The steep sandy bank appears to have reached a stable angle of repose (Location 10).

### ***Historic Standing Buildings, Structures and Components***

Hugh Henry, an Architectural Historian qualified under 36 CFR 61, prepared the document entitled, *Five-Year Inspection Report on Historic Components of the Pierce Mills, Arnold Falls, Gage, and Passumpsic Hydroelectric Stations (FERC Nos. 2396, 2399, 2397, and 2400)* in November 2010. This report, prepared in compliance with Subsection 3.1.2 of the Project CRMP, provides a summary of changes within the Project since the development of the current CRMP and is presented as Appendix A in this report.

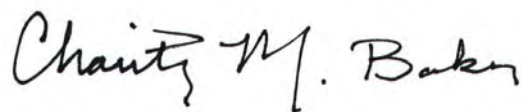
### **Summary**

With the few exceptions noted above, the shorelines within the Project remain stable and relatively unchanged from previous inspections. Currently, no known or potential archaeological sites are threatened by the identified erosion events within the Project.

CVPS proposes the following management actions for 2011:

- Continue annual monitoring of the Project shoreline with emphasis on archaeologically sensitive areas and comparisons with previously observed areas of disturbance. Monitoring will include close examination of moderately or severely eroded banks for evidence of exposure of archaeological information.
- Work with the Caledonia County Natural Resources Conservation District (NRCD) and other organizations interested in protecting and managing resources in the river corridor.

Sincerely,



Charity Baker

cc. Abenaki Nation  
Kimberly D. Bose, FERC  
Beth Eliason, CVPS  
Kerry Gemmett O'Brien, NRCD  
John Greenan, CVPS  
Hugh Henry, Architectural Historian  
Giovanna Peebles, SHPO, Vermont Division for Historic Preservation  
Mike Miller, Environmental Innovations  
Mike Scarzello, CVPS





**Location 1: Erosion near powerline at upper limit of the Project, looking southwest. August 19, 2010.**



**Location 2: Erosion on left outer bend within the Pierce Mills impundment, looking northeast. August 19, 2010.**





**Location 3: Erosion on left outer bend of the river adjacent to gravel pit within the **Arnold Falls** impoundment, looking southeast, August 19, 2010.**

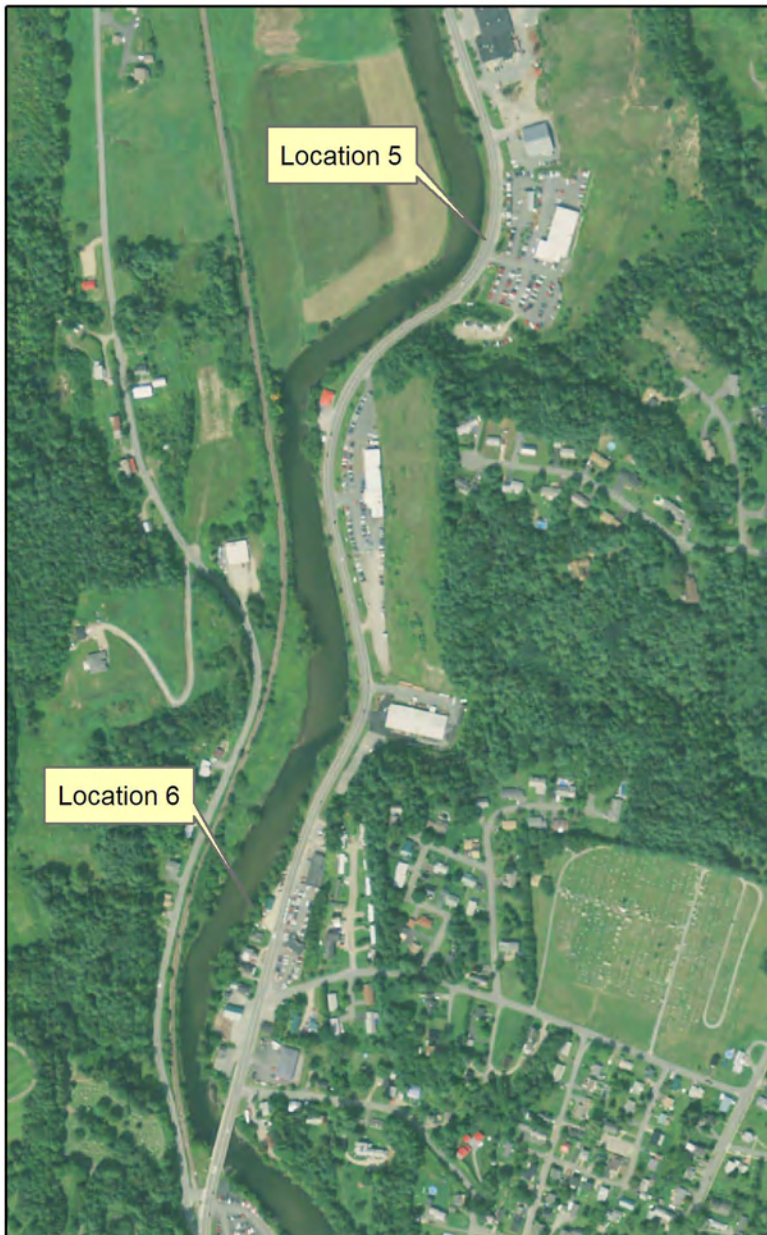


**Location 4: Sand bar protecting Native American site designated as FS 3 (CA) looking south. August 19, 2010.**

0 100 200 400 Meters

NAIP 2008 Vermont Dataset, Collected Summer 2008  
 USDA-FSA-APFO Aerial Photography Field Office, Published April 30, 2009  
 NAIP\_1M\_CLRIR\_2008 Digital Ortho Photo Image,  
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 Available at <http://www.vcgi.org/>





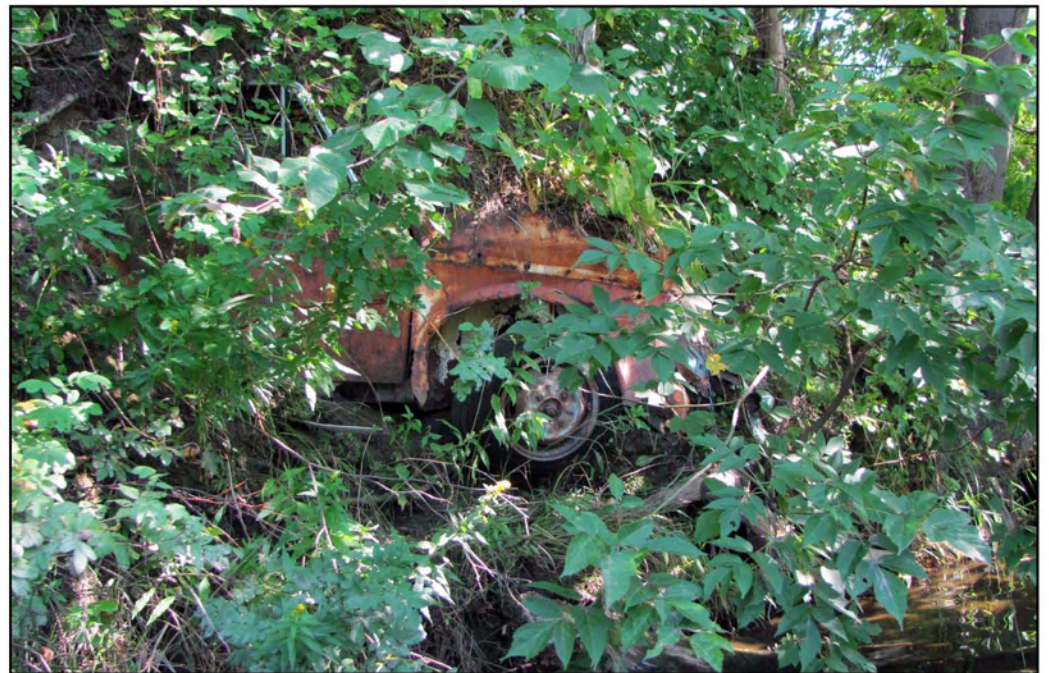
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NAIP 2008 Vermont Dataset, Collected Summer 2008  
 USDA-FSA-APFO Aerial Photography Field Office, Published April 30, 2009  
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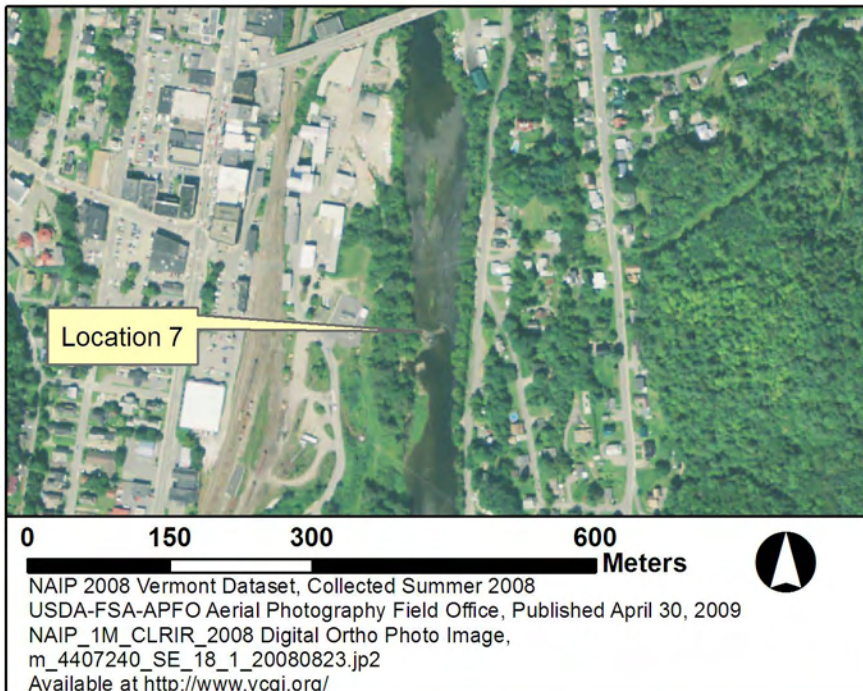


**Location 5: Typical shoreline along the Arnold Falls impoundment adjacent to US Route 5 highway, looking southeast, August 19, 2010.**

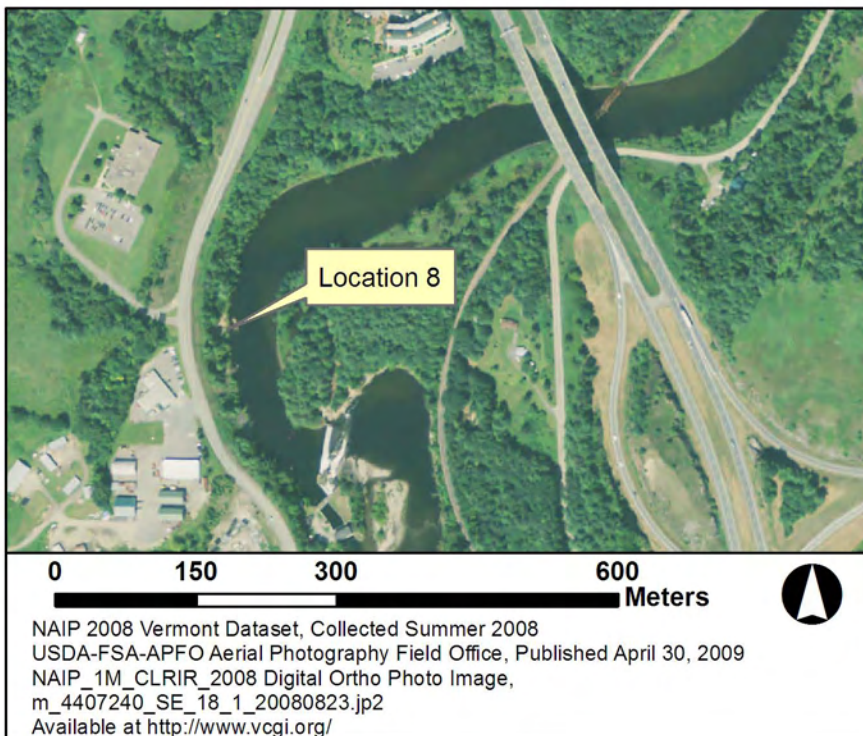


**Location 6: Old car embedded in left riverbank below US Route 5 highway, looking east. August 19, 2010.**



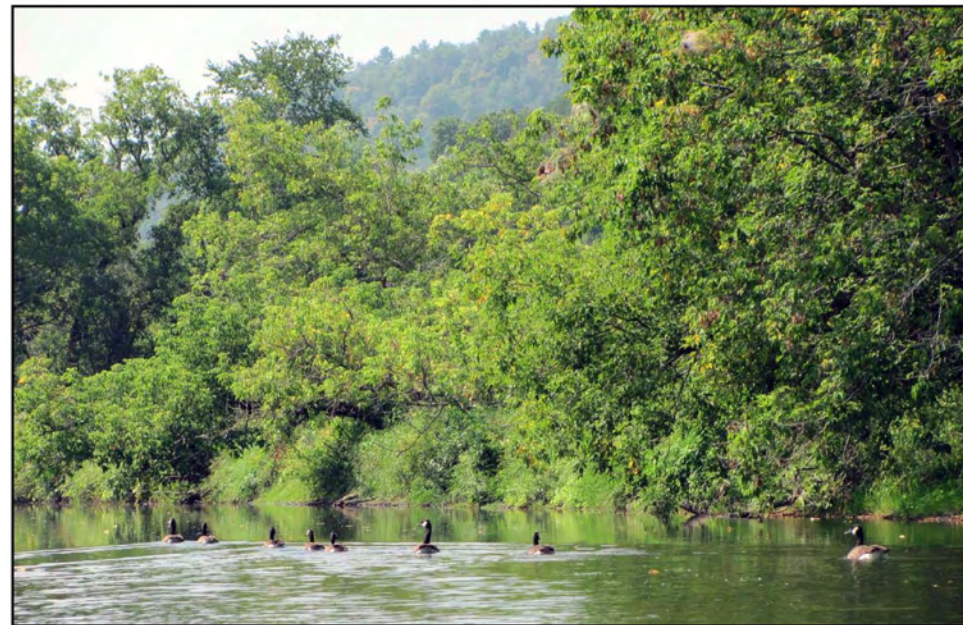
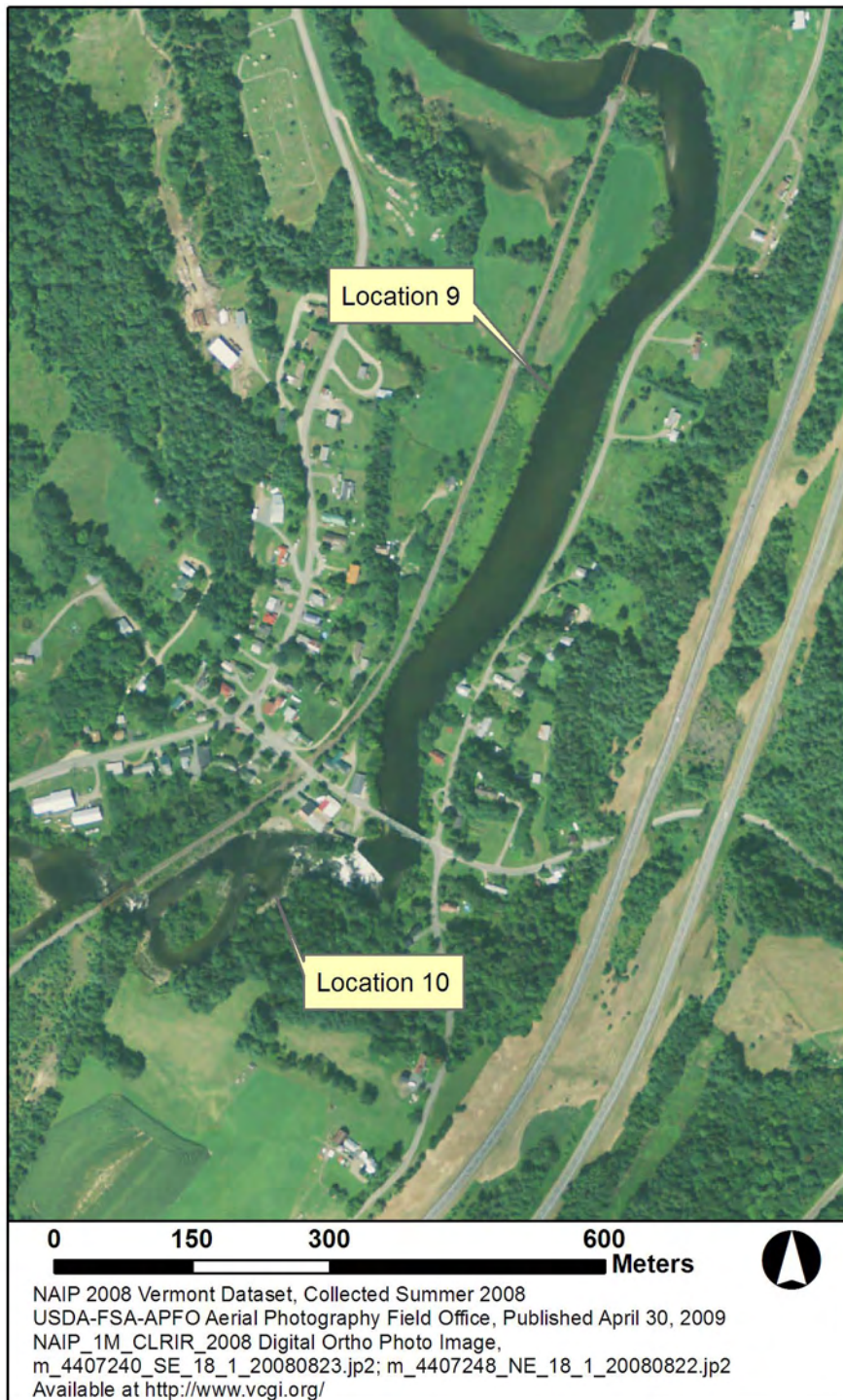


**Location 7: Exposed timber crib dam ruins associated with Twin State Gas & Electric Co. No. 2 plant (1922-1944) within the Gage impoundment, looking south. August 31, 2010.**



**Location 8: Stone rip-ripped right bank adjacent to US Route 5 upstream of the Gage generating station, looking northwest, August 31, 2010.**





**Location 9: Stable right bank above Passumpsic generating station, looking southwest. August 31, 2010.**



**Location 10: Steep eroded bank below Passumpsic dam has remained relatively stable in past several years, looking south, August 31, 2010.**



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## **FIVE-YEAR INSPECTION REPORT ON HISTORIC COMPONENTS PIERCE MILLS, ARNOLD FALLS, GAGE, AND PASSUMPSIC HYDROELECTRIC STATIONS (FERC Nos. 2396, 2399, 2397, and 2400)**

**CENTRAL VERMONT PUBLIC SERVICE CORPORATION  
ST. JOHNSBURY, WATERFORD, AND BARNET, VERMONT  
NOVEMBER 2010**

### **Introduction**

This report presents the results of field inspections of the existing buildings, structures, and other major components at the Pierce Mills, Arnold Falls, Gage, and Passumpsic hydroelectric stations (FERC Nos. 2396, 2399, 2397, and 2400, respectively), located on the Passumpsic River in St. Johnsbury, Waterford, and Barnet, Vermont. The Central Vermont Public Service Corporation (CVPS), Rutland, Vt. owns and operates these four stations under individual forty-year licenses issued by the Federal Energy Regulatory Commission (FERC) on 8 December 1994.

The current Cultural Resource Management Plan (CRMP) for the Pierce Mills, Arnold Falls, Gage, and Passumpsic hydroelectric stations was approved by the FERC on 28 February 2000. The CRMP states in Subsection 2.1 that “At the present time, the four facilities appear eligible for inclusion in the National Register [of Historic Places]...” Furthermore, the plan specifies in Subsection 3.1.2 that “All structures and features will be subject to field surveys on a five-year official schedule by a 36 CFR 61 qualified professional architectural historian to assess their condition and potential eligibility for the National Register.”

The specific components subject to this inspection are listed in four tables contained in Appendix C of the CRMP; these include the buildings, structures, and major pieces of equipment. The tables were compiled from the content of National Register documentation prepared in 1992 and research conducted for the revised CRMP (1999). Most components of the four stations are considered eligible for the National Register as elements that contribute to their historic significance. Subsequent to 1999, CVPS actions (described below) to replace the substation at Pierce Mills (2002) and both dams and the switchgear at Arnold Falls (2008-09) have rendered those components ineligible owing to their age of less than fifty years.

The field inspection occurred on 12 November 2010 at the Pierce Mills, Arnold Falls, Gage, and Passumpsic hydroelectric stations. A consulting architectural historian, Hugh H. Henry, performed the inspection, and used the results to prepare this report. Frank Chaloux, Hydroelectric Foreman, CVPS, St. Johnsbury, Vt. provided both information about recent CVPS actions at the four stations and assistance in the field.

### **Recent Actions Affecting Historic Components**

The CRMP for the Pierce Mills, Arnold Falls, Gage, and Passumpsic hydroelectric stations states in Subsection 3.1.1 that “Operation of the facilities will be guided by the concept of management known as ‘continuity of use’.” This concept adopts the premise that preservation of the historic character of the hydroelectric stations depends on their continuing operation. Furthermore, successful operation may involve changes in types of components and materials to maintain physical integrity, economic viability, employee safety, and environmental protection.

Since the 1992 documentation and 1999 CRMP revision, CVPS has performed substantial actions affecting historic components of the Pierce Mills and Arnold Falls generating stations. In accordance with Subsection 3.1.2 of the CRMP, these actions received review and approval by



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the State Historic Preservation Officer (SHPO - Vermont Division for Historic Preservation) under the 36 CFR 800 regulations implementing Section 106 of the National Historic Preservation Act.

At the Pierce Mills station in 2002, CVPS removed the original (1928-29) electrical substation with its skeletal steel superstructure, three step-up transformers at ground level, and ancillary equipment. A new wood-pole structure was erected nearby to support the transformers and equipment in an elevated position, and thereby meet the National Electrical Safety Code while reducing vandalism.

In 2008, CVPS removed the timber headgate at the Pierce Mills dam along with the twin wood stems (posts) that supported the steel gearing of the hoist for moving the vertically sliding gate. A new steel-plate gate having the same dimensions was installed within the same well in the concrete intake structure, and the original gearing was attached to new steel I-beam stems.

The first of two major actions at the Arnold Falls station occurred in 2008, after being precipitated by a 2007 failure in the antiquated electrical switchgear inside the powerhouse. CVPS removed both the original (1928) slate switchboard and exposed hard-wired switchgear. Installed in the same position on the generating floor, new steel cabinets contain the technologically advanced, solid-state switchgear.

More extensive structural change followed in 2009, when CVPS engaged the Bancroft Contracting Co., South Paris, Maine to construct new concrete dams abutting the downstream faces of the North and South log-crib dams that were decayed and slumping after having been mostly rebuilt in 1976-77. The latter structures remain in place but are entirely submerged in the impoundment behind the new dams; the crest elevation of the concrete dams plus steel flashboards matches the licensed elevation of the log-crib dams. The concrete dams constitute relatively permanent improvements in contrast to the limited service life of the log-crib structures.

### **Current Status and Condition of Historic Components**

The buildings, structures, and other major components of the Pierce Mills, Arnold Falls, Gage, and Passumpsic hydroelectric stations are being maintained generally in serviceable physical and mechanical condition. In certain cases described below, individual historic components need either structural repairs or surficial treatment to maintain sound condition. At the present (2010), the condition of none of the components has reached the stage of impairing their eligibility for listing in the National Register.

#### ***Pierce Mills Station***

The powerhouse suffered considerable damage in September 2010 when vandals attacked the building, smashing many lights of glass in the steel-framed sash of the large round-arched windows and breaking into the interior to steal small equipment. Shards of glass penetrated the electrical switchgear near one window and also the generator casing, requiring painstaking removal to avoid serious operational damage to those major components. CVPS has replaced the broken translucent glass lights with textured Lexan panels in order to reduce the risk of similar damage in the future.

While generally in sound condition, the brick masonry of the building needs repointing of the eroded mortar in courses below the windows on the two-bay east facade.

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#### ***Arnold Falls Station***

As described above, the Arnold Falls station has received extensive rehabilitative work in recent years involving the dams and the electrical switchgear. At present (2010), the steel headgate (installed in 1979) and its twin geared steel stems show surficial rusty patches and need painting to protect their durability.

#### ***Gage Station***

The reinforced concrete powerhouse at the Gage station (completed in 1921) differs in exterior material from the brick masonry common to counterparts at the other CVPS Passumpsic stations (dating from 1928-29). The concrete, however, has developed structural cracks and surficial spalling; both are especially evident on the east and south facades near the northeast and southeast corners of the building. (The vertical crack near the northeast corner follows roughly the line of the interior chimney.) After flood damage in 1973, the lower wall of the south facade was resurfaced with concrete but that material has also cracked and spalled. The extent of such damage indicates that substantial repairs will become necessary in the near future.

The overscale square-headed windows on the main story of the powerhouse were fitted with replacement large-light fixed sash in 1988. However, there exists on the exposed basement level of the east facade a horizontally elongated window that retains its original multi-light wood sash. This sash has deteriorated, and needs puttying and painting to restore sound condition.

Similar to the powerhouse, the power canal (also from 1921) possesses side walls constructed of reinforced concrete. Both the east and west walls have developed structural cracks and surficial spalling that need repairs.

Twin skeletal steel towers support the cableway (1928) that spans the river above the dam; its suspended traveling car provides access to the flashboards on the dam crest. The historic towers have become somewhat rusty, and need painting to preserve their durability in the damp riverside setting.

#### ***Passumpsic Station***

The main entrance on the north facade of the powerhouse was flanked originally by twin light fixtures with glass globes. After vandals broke the globes, the fixtures were removed from the bases attached to the brick wall. The metal bases remain in place but are rusty and obviously lack something. CVPS possesses photographs showing the original fixtures in position, and could probably obtain similar ones to restore these features that contribute noticeably to the Georgian Revival architectural design of the powerhouse.

CVPS practices ongoing maintenance to keep the components of the Pierce Mills, Arnold Falls, Gage, and Passumpsic hydroelectric stations in serviceable condition, whether by repairing, replacing in kind, or installing contemporary counterparts where necessary. This practice has generally preserved the physical and historic integrity of the buildings and structures. CVPS continues to operate the generating stations whenever sufficient flow exists in the Passumpsic River, and thereby pursue the continuity of use necessary for their preservation. Accordingly, the four stations appear to retain eligibility for listing in the National Register of Historic Places.

#### **Qualifications of Consultant**

The consultant who prepared this inspection report, Hugh H. Henry, Chester, Vermont, meets the requirements of 36 CFR Part 61 as a qualified architectural historian. Among a broad range of



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activities during three decades of professional experience, Mr. Henry has prepared National Register documentation and assessments of eligibility for several hydroelectric stations in Vermont.

### Sources

*Cultural Resource Management Plan for Archaeological and Historic Resources within the Pierce Mills, Arnold Falls, Gage, and Passumpsic Hydroelectric Facilities.* Prepared for Central Vermont Public Service Corp., Rutland, Vt. by Douglas Frink, Archaeology Consulting Team, Inc., Essex, Vt. September 1998, Revised August 1999.

National Register of Historic Places Registration Form: "Gage Hydroelectric Station." Prepared by M. H. Bowers, Louis Berger & Associates, Inc., Waltham, Mass. October 1992.

National Register of Historic Places Registration Form: "Twin State Gas & Electric Company Hydroelectric Power Station Historic District." Prepared by M. H. Bowers, Louis Berger & Associates, Inc., Waltham, Mass. October 1992.

*Section 106 Report - Arnold Falls Hydroelectric Station (FERC No. 2399) - North and South Dams, Central Vermont Public Service Corp., St. Johnsbury, Vermont.* Prepared by Hugh H. Henry, Consulting Architectural Historian, Chester, Vt. 2009.

*Section 106 Report - Arnold Falls Hydroelectric Station (FERC No. 2399) - Switchboard and Switchgear, Central Vermont Public Service Corp., St. Johnsbury, Vermont.* Prepared by Hugh H. Henry, Consulting Architectural Historian, Chester, Vt. 2007.

*Section 106 Report - Pierce Mills Hydroelectric Station (FERC No. 2396) - Substation, Central Vermont Public Service Corp., St. Johnsbury, Vermont.* Prepared by Hugh H. Henry, Consulting Architectural Historian, Chester, Vt. 2002.